E7.4-10412
CR-137271

SATELLITE GEOLOGICAL AND GEOPHYSICAL REMOTE SENSING OF ICELAND

Richard S. Williams, Jr.
U. S. Geological Survey
Reston, Virginia 22090

1 January 1974

Type I Progress Report for Period 1 November 1973 - 31 December 1973

Prepared for:

Goddard Space Flight Center
Greenbelt, Maryland 20771

(E74-10412) SATELLITE GEOLOGICAL AND GEOPHYSICAL REMOTE SENSING OF ICELAND Progress Report, 1 Nov. - 31 Dec. 1973 (Geological Survey, Reston, Va.) 10 p HC $4.00 CSCL 08G G3/13

N74-19947

Unclas 00412

Publication authorized by the Director, U. S. Geological Survey

gives an indication of seasonal changes in melting rates of glaciers. Changes in area of lakes, particularly glacier-margin lakes can be mapped most easily on MSS, color composites. New maps are being prepared of most of the areas covered by glacial ice in Iceland. An updated geographic index for ERTS-1 imagery of Iceland has been prepared. Recently deglaciated terrain can be distinguished on MSS, color composites because of the lack of vegetation when compared with older deglaciated terrain. The increase in surface area of the ice-dammed lake, Grænalón, was monitored until the occurrence of a jökulhlaup, after which the surface area of the lake was considerably reduced. The effect of two subglacial jökulhlaups on the overlying ice cover can be seen in the form of collapse features in the surface of Vatnajökull. MSS, color composites permit the mapping of 5 distinct vegetation types (forested areas, cultivated areas, grasslands, reclaimed areas, and lichen-covered bedrock) and barren areas (lack of color). The high latitude of Iceland permits considerable stereoscopic coverage on side-lapping ERTS imagery. Features with relief as small as 100 m can be discerned. The ability to map landforms, vegetation distribution, occurrence of snowcover, glaciers, and geologic structure stereoscopically permits a much greater accurate analysis of these features. [1C, 2B, 3I, 4D, 4G, 4H, 5H, 10A]

f. A listing of published articles, and/or papers, preprints, in-house reports, abstracts of talks, that were released during the reporting period:

Papers

Williams, R. S., Jr., Boðvarsson, Ágúst, Friðriksson, Sturla, Pálmason, Guðmundur, Rist, Sigurjón, Sigtryggsson, Hlynur, Sæmundsson, Kristján, Thorarinsson, Sigurður, and Thorsteinsson, Ingvi, 1973, Iceland: Preliminary results of geologic, hydrologic, oceanographic, and agricultural studies with ERTS-1 imagery: Special Report No. 2 to NASA, Goddard Space Flight Center, Greenbelt, Md., under ERTS-1 experiment SR 651, Satellite Geological and Geophysical Remote Sensing of Iceland; Reprint of paper published in Proceedings of Symposium on Management and Utilization of Remote Sensing Data, American Society of Photogrammetry (1973), p. 17-35.

Williams, R. S., Jr., Thorarinsson, Sigurður, and Sæmundsson, Kristján, 1973, Vatnajökull area, Iceland: New volcanic and structural features on ERTS-1 imagery: Special Report No. 3 to NASA, Goddard Space Flight Center, Greenbelt, Md., under ERTS-1 experiment SR 651, Satellite Geological and Geophysical Remote Sensing of Iceland; Reprint of abstract published in Geological Society of America Abstracts with Programs, 1973 Annual Meetings, v. 5, no. 7, October, p. 864-865.

Type I Progress Report
ERTS-1

a. Title: Satellite Geological and Geophysical Remote Sensing of Iceland

ERTS-A Proposal No.: SR 651

b. GSFC ID No. of P. I.: IN 079

c. Statement and explanation of any problems that are impeding the progress of the investigation:

Only the two problems noted in previous Type I and Type II reports: (1) the discontinuous coverage of Iceland which when combined with persistent cloudiness (successive passage of low pressure systems), limits available cloud-free imagery of all of Iceland on a seasonal basis; and (2) the absence of March through June imagery because of tape recorder problems in 1973. The spring and early summer months are the time of rapid decrease in snowcover, increase in runoff and flooding, and early growth of vegetation.

d. Discussion of the accomplishments during the reporting period and those planned for the next reporting period:

(1) A paper on the geological importance of ERTS imagery of Vatnajökull, Iceland, was presented at the Geological Society of America Annual Meetings in Dallas, Texas.

(2) A summary on the results of the ERTS experiment in Iceland was submitted to, and accepted for presentation at, (and eventual publication in the Proceedings) the Ninth International Symposium on Remote Sensing of Environment, Ann Arbor, Michigan.

(3) Two lectures on ERTS, one on the work in Iceland, the other on ERTS in general, were given at the State University of New York, Cortland, New York.

(4) All ERTS-1 imagery of Iceland, which was acquired since the summer of 1973, was catalogued, studied, and annotated.

(5) The next two months will be directed at making plans for the preparation of special orthoimage maps of Iceland and placing more research emphasis on the mapping of glaciological phenomena.

e. Discussion of significant scientific results and their relationship to practical applications or operational problems including estimates of the cost benefits of any significant results (to be prepared in scientific abstract form of 200 words or less):

The seasonal change in size of sediment plumes from the many glacial rivers which discharge into the sea along the south coast

Presentations

Williams, R. S., Jr., Thorarinsson, Sigurður, and Sæmundsson, Kristján, 1973, Vatnajökull area, Iceland: New volcanic and structural features on ERTS-1 imagery: Geological Society of America, 1973 Annual Meetings, Dallas, Texas, 14 November.

Williams, R. S., Jr., 1973, Iceland: Preliminary results of geologic, hydrologic, oceanographic, and agricultural studies with ERTS-1 imagery: Lecture presented to Department of Geology, State University of New York (College at Cortland), Cortland, New York, 29 November.

Williams, R. S., Jr., 1973, ERTS-1: A new window on our planet: Lecture presented to Department of Geology, State University of New York (College at Cortland), Cortland, New York, 29 November.

g. Recommendation concerning practical changes in operations, additional investigative effort, correlation of effort and/or results as related to maximum utilization of the ERTS system:

None.

h. A listing by date of any changes in Standing Order Forms:

N/A

i. ERTS Image Descriptor Forms:

Four forms provided as attachment to this report.

j. Listing by date of any changed Data Request Forms submitted to Goddard Space Flight Center/NDPF during the reporting period:

None.

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

NDPF USE ONLY
D _____
N _____
ID _____

DATE 1 January 1974

PRINCIPAL INVESTIGATOR Richard S. Williams, Jr.

GSFC IN 079

ORGANIZATION U. S. Geological Survey

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
1392-12182-5 1392-12182-7 1392-12182-B				Cape Coast Coast Line EEO Crater (Shield Volcano) EEO Fault (Transform) Rift Fracture Zone Fiord Floodplain Grassland Harbor Highway Island Lake Lava Dunes EEO Mountain (Móberg) Pasture Peninsula Rangeland River Advancing shoreline Snow Snowpack Vegetation Volcano

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO NDPF USER SERVICES
CODE 563
BLDG 23 ROOM E413
NASA GSFC
GREENBELT, MD. 20771
301-982-5406

GSFC 37-2 (7/72)

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

NDPF USE ONLY
D _____
N _____
ID _____

DATE 1 January 1974

PRINCIPAL INVESTIGATOR Richard S. Williams, Jr.

GSFC IN 079

ORGANIZATION U. S. Geological Survey

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
1392-12185-4 1392-12185-5 1392-12185-6 1392-12185-7 1392-12185-B (Continued)				EEO Active Glacier Caldera EEO Crater Forest EEO End Moraine Fault Floodplain Geology Geothermal Area (Altered ground) Glacier Cape EEO Cirques Lakes EEO Moraine EEO Nunatak River Snow Volcano Snowpack Dunes Advancing Shoreline Bays EEO Baymouth Bar Coast Coast line EEO Ice Caps EEO Mountain (Móberg) Desert Fiord Grassland Rangeland Pasture Highway Harbor

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO NDPF USER SERVICES
CODE 563
BLDG 23 ROOM E413
NASA GSFC
GREENBELT, MD. 20771
301-982-5406

GSFC 37-2 (7/72)

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

NDPF USE ONLY
D
N
ID

DATE 1 January 1974

PRINCIPAL INVESTIGATOR Richard S. Williams, Jr.

GSFC IN 079

ORGANIZATION U. S. Geological Survey

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
1392-12185-4				Island
1392-12185-5				Lagoon
1392-12185-6				Lava
1392-12185-7				Littoral Drift
1392-12185-B				Peninsula
				Sediment
				Vegetation

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO NDPF USER SERVICES
CODE 563
BLDG 23 ROOM E413
NASA GSFC
GREENBELT, MD. 20771
301-982-5406

GSFC 37-2 (7/72)

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

NDPF USE ONLY
D _____
N _____
ID _____

DATE 1 January 1974

PRINCIPAL INVESTIGATOR Richard S. Williams, Jr.

GSFC IN 079

ORGANIZATION U. S. Geological Survey

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
1392-12191-4 1392-12191-5 1392-12191-6 1392-12191-7 1392-12191-B (Continued)				EEO Active Glacier Advancing Shoreline EEO Braided Stream EEO Caldera Cinder Cone Coast Coastal Plain Coastline EEO Crater EEO End Moraine Fault Lake EEO Glacier (Ice Cap) Graben EEO Moraine EEO Outwash Plain Snow EEO Volcano EEO Active Volcano Lava EEO Tectonic Fissures (Gja) Snowpack EEO Snowline Cape Peninsula Cartography Island EEO Vegetation Grassland Rangeland Pasture EEO Tephra (Volcano Ash) Fallout Pattern Sediment

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO NDPF USER SERVICES
CODE 563
BLDG 23 ROOM E413
NASA GSFC
GREENBELT, MD. 20771
301-982-5406

GSFC 37-2 (7/72)

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

NDPF USE ONLY
D
N
ID

DATE 1 January 1974

PRINCIPAL INVESTIGATOR Richard S. Williams, Jr.

GSFC IN 079

ORGANIZATION U. S. Geological Survey

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
1392-12191-4				Rift Zone
1392-12191-5				EEO Nunatak
1392-12191-6				Morainal Lake
1392-12191-7				Littoral Drift
1392-12191-8				Lagoon
				Highway
				EEO Geothermal area
				EEO Shield Volcano
				EEO Mőberg Ridges
				Fiord
				Desert
				Forest
				EEO Bayhead Bar
				Harbor
				Bay
				Dune
				Coastal Dunes

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO NDPF USER SERVICES
CODE 563
BLDG 23 ROOM E413
NASA GSFC
GREENBELT, MD. 20771
301-982-5406

GSFC 37-2 (7/72)

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

NDPF USE ONLY
D _____
N _____
ID _____

DATE 1 January 1974

PRINCIPAL INVESTIGATOR Richard S. Williams, Jr.

GSFC IN 079

ORGANIZATION U. S. Geological Survey

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
1392-12194-5 1392-12194-6 1392-12194-B				Advancing shoreline Cape Cartography Cinder cone Crater Island Lava Volcano

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO NDPF USER SERVICES
CODE 563
BLDG 23 ROOM E413
NASA GSFC
GREENBELT, MD. 20771
301-982-5406

GSFC 37-2 (7/72)